# TABLE OF CONTENTS

## EKHBRD-AAY1


1 Features ..... 74

2 Specifications ..... 75
Technical Specifications ..... 75
Electrical Specifications ..... 76

3 Capacity tables ..... 77
Combination table ..... 77

4 Dimensional drawing & centre of gravity ..... 78
Dimensional drawing ..... 78

5 Piping diagram ..... 79

6 Wiring diagram ..... 80
Wiring diagram ..... 80
External connection diagram ..... 83

7 Sound data ..... 84
Sound pressure spectrum ..... 84
Sound power spectrum ..... 85

8 Operation range ..... 86

9 Hydraulic performance ..... 88
Static pressure drop unit ..... 88

# 1 Features

- High temperature application: up to 80°C without electric heater
- Three phase large capacity indoor unit
- Cost effective alternative to a fossil fuel boiler
- Low energy bills and low CO2 emissions
- Easy to install
- Total solution for year round comfort

# 2 Specifications

| 2-1 Technical Specifications | | | | EKHBRD011AAY1 | EKHBRD014AAY1 | EKHBRD016AAY1 |
|---|---|---|---|---|---|---|
| Casing | Colour | | | Metalic grey | | |
| | Material | | | Precoated sheet metal | | |
| Dimensions | Packing | Height | mm | 860 | 860 | 860 |
| | | Width | mm | 680 | 680 | 680 |
| | | Depth | mm | 800 | 800 | 800 |
| | Unit | Height | mm | 705 | 705 | 705 |
| | | Width | mm | 600 | 600 | 600 |
| | | Depth | mm | 695 | 695 | 695 |
| Weight | Unit | | kg | 147.25 | | |
| | Packed Unit | | kg | 156 | 156 | 156 |
| Packing | Material | | | EPS | | |
| | | | | Cardboard | | |
| | | | | MDF | | |
| | | | | Wood (pallet) | | |
| | | | | Metal | | |
| | Weight | | kg | 8,75 | | |
| Main components | Refrigerant side heat exchanger | Type | | Plate heat exchanger | | |
| | | Quantity | | 1 | 1 | 1 |
| Refrigerant side heat exchanger | Plates | Quantity | | 60 | 60 | 60 |
| Main components | Refrigerant side heat exchanger | Material | | AISI 316 | | |
| | | Insulation material | | EPDM type | | |
| | Pump | Type | | DC motor | | |
| | | Nr. of speed | | inverter controlled | | |
| Pump | Nominal ESP unit | Heating | kPa | 94,0 | 91,9 | 89,7 |
| Main components | Pump | Power input | W | 87 | 95 | 101 |
| | Water side Heat exchanger | Type | | Plate heat exchanger | | |
| | | Qty | | 1 | 1 | 1 |
| Water side Heat exchanger | Plates | Quantity | | 50 | 50 | 50 |
| Main components | Water side Heat exchanger | Material | | AISI 316 | | |
| | | Water volume | l | 2.78 | 2.78 | 2.78 |
| Water side Heat exchanger | Water flow rate Nom. | Heating | l/min | 15,8 | 20,1 | 22,9 |
| Main components | Water side Heat exchanger | Water flow rate Max. | l/min | 31,6 | 40 | 45,8 |
| | | Insulation material | | EPDM type | | |
| | Expansion vessel | Volume | l | 12 | 12 | 12 |
| | | Max. water pressure | bar | 3 | 3 | 3 |
| | | Pre pressure | bar | 1 | 1 | 1 |
| | Water filter | Diameter perforations | mm | 1 | 1 | 1 |
| | | Material | | Brass | | |
| | Cascade compressor | Quantity | | 1 | 1 | 1 |
| Cascade compressor | Motor | Type | | Hermetically sealed scroll compressor | | |
| | | Starting Method | | Direct on line | | |
| Motor | Crankcase Heater | Quantity | | 1 | 1 | 1 |
| Cascade compressor | Motor | Crankcase Heater Output | W | 33 | 33 | 33 |
| Water circuit | Piping connections diameter | | inch | G 1"1/4 (female) | | |
| | Piping | | inch | 1" | | |
| | Safety valve | | bar | 3 | 3 | 3 |
| | Manometer | | | Yes | | |
| | Drain valve / Fill valve | | | Yes | | |
| | Shut off valve | | | Yes | | |
| | Air purge valve | | | Yes | | |
| Heating water system | Water volume | Min | l | 20 | 20 | 20 |
| | | Max | l | 400 | 400 | 400 |

# 2 Specifications

| 2-1 Technical Specifications | | | | EKHBRD011AAY1 | EKHBRD014AAY1 | EKHBRD016AAY1 |
|---|---|---|---|---|---|---|
| Refrigerant Circuit | Gas side diameter | | mm | 15,9 | | |
| | Liquid side diameter | | mm | 9,52 | | |
| | High pressure side | Design pressure | bar | 38 | 38 | 38 |
| Sound level | Sound Pressure | | dBA | 43(1) / 46(2) | 45(1) / 46(2) | 46(1) / 46(2) |
| Sound Level Night Quiet | Sound Pressure | | dBA | 40 | 43 | 45 |
| Ambient | Heating | Min | °C | -20 | -20 | -20 |
| | | Max | °C | 20 | 20 | 20 |
| | Domestic hot water | Min | °C | -20 | -20 | -20 |
| | | Max | °C | 35 | 35 | 35 |
| Waterside | Heating | Min | °C | 25 | 25 | 25 |
| | | Max | °C | 80 | 80 | 80 |
| | Domestic hot water | Min | °C | 25 | 25 | 25 |
| | | Max | °C | 80 | 80 | 80 |
| Installation place | | | | Indoor | | |
| Notes | | | | Nominal water flow rate for Dt = 10°C | | |
| | | | | Maximum water flow rate for Dt = 5°C | | |
| | | | | (1) Sound levels are measured at condition 1: EW: 55°C; LW: 65°C | | |
| | | | | (2) Sound levels are measured at condition 3: EW: 70°C; LW: 80°C | | |
| | | | | Sound level in night quiet mode is measured at condition 1: EW: 55°C; LW: 65°C | | |
| | | | | Sound level is valid in free field condition because it is measured in a semi-anechoic room. Measured value under actual installation conditions will be higher due to environmental noise and sound reflections. Values are sound pressure values measured at all sides (front, back, left, right, top) at 1m distance. The values do not occur simultaneously on all mentioned sides. | | |
| | | | | For details on operation range: cf. TW drawing | | |

| 2-2 Electrical Specifications | | | | EKHBRD011AAY1 | EKHBRD014AAY1 | EKHBRD016AAY1 |
|---|---|---|---|---|---|---|
| Wiring connections | Power Supply | Name | | Y1 | | |
| | | Phase | | 3~ | | |
| | | Frequency | Hz | 50 | 50 | 50 |
| | | Voltage | V | 380-415 | | |
| | Maximum running Current | Heating | A | 12,5 | | |
| | Recomended fuses | | A | 16 | 16 | 16 |
| | Voltage range | Minimum | | -10% | | |
| | | Maximum | | +10% | | |
| | For Power Supply | Quantity | | 4G | | |
| | | Type of wires | | (3) Select diameter and type according to national and local regulations | | |
| | | Quantity | | 4G+2G | | |
| | | Connection type | | For power supply with benefit kWh rates | | |
| | | Type of wires | | (3) Select diameter and type according to national and local regulations | | |
| Power Supply Intake | | | | Both indoor and outdoor unit | | |
| Wiring connections | Connection type | | | For connection with outdoor unit | | |
| | Quantity of wires | | | 2 | 2 | 2 |
| | Type of wires | | | F1+F2 | | |

# 3 Capacity tables

## 3 - 1 Combination table

### EKHBRD-AAY1

I. Pair outdoor / pair indoor combination table

| Heating only indoor unit | Heating only outdoor unit | ER(S/R)Q011AAV1 | ER(S/R)Q014AAV1 | ER(S/R)Q016AAV1 | ER(S/R)Q011AAY1 | ER(S/R)Q014AAY1 | ER(S/R)Q016AAY1 |
|---|---|---|---|---|---|---|---|
| EKHBRD011AAV1 | | ○ | — | — | — | — | — |
| EKHBRD014AAV1 | | — | ○ | — | — | — | — |
| EKHBRD016AAV1 | | — | — | ○ | — | — | — |
| EKHBRD011AAY1 | | — | — | — | ○ | — | — |
| EKHBRD014AAY1 | | — | — | — | — | ○ | — |
| EKHBRD016AAY1 | | — | — | — | — | — | ○ |

Note:
ERRQ units include special equipment (insulation, heater sheet, ...) to ensure good operation in areas where low ambient temperature can occur together with high humidity conditions. In such conditions the ERSQ models may experience problems with severe ice build up on the aircooled coil. In case such conditions are expected, the ERRQ must be installed instead. These models contain countermeasures (insulation, heater sheet, ...) to prevent freeze up.

II. Kit availability
1. Kits connected to the outdoor unit

| Reference | Description | ERSQ011** | ERSQ014** | ERSQ016** | ERRQ011** | ERRQ014** | ERRQ016** |
|---|---|---|---|---|---|---|---|
| EKDK04(1) | Drain kit | ○ | ○ | ○ | — | — | — |
| EKBPHTH16A | Bottom plate heater | ○ | ○ | ○ | — | — | — |

2. Kits connected to the indoor unit

| Reference | Description | | | | | | |
|---|---|---|---|---|---|---|---|
| | Heating only model EKHBRD** | 011AAV1 | 011AAY1 | 014AAV1 | 014AAY1 | 016AAV1 | 016AAY1 |
| EKHTS200A | Stainless domestic hot water tank 200l | ○ | ○ | ○ | ○ | ○ | ○ |
| EKHTS260A | Stainless domestic hot water tank 260l | ○ | ○ | ○ | ○ | ○ | ○ |
| EKHTSU200AA | Stainless domestic hot water tank 200l UK - Version | ○ | ○ | ○ | ○ | ○ | ○ |
| EKHTSU260AA | Stainless domestic hot water tank 260l UK - Version | ○ | ○ | ○ | ○ | ○ | ○ |
| EKHTSP200AA | Stainless domestic hot water tank 200l passivated tank with service hole | ○ | ○ | ○ | ○ | ○ | ○ |
| EKHTSP260AA | Stainless domestic hot water tank 260l passivated tank with service hole | ○ | ○ | ○ | ○ | ○ | ○ |
| EKRP1HBA | Digital I/O PCB | ○ | ○ | ○ | ○ | ○ | ○ |
| EKRP1AHTA | Demand PCB (3) | ○ | ○ | ○ | ○ | ○ | ○ |
| EKRUAHTA | Remote user interface (4) | ○ | ○ | ○ | ○ | ○ | ○ |
| EKRTW | Room thermostat (2) | ○ | ○ | ○ | ○ | ○ | ○ |
| EKRTR | Room thermostat (2) | ○ | ○ | ○ | ○ | ○ | ○ |
| EKRTETS | Room thermostat (2) | ○ | ○ | ○ | ○ | ○ | ○ |

Kits connected to the domestic hot water tank

| Reference | Description | | | | | | |
|---|---|---|---|---|---|---|---|
| | EKHTS<br>EKHTSU<br>EKHTSP | 200A | 260A | 200AA | 260AA | 200AA | 260AA |
| EKUHWHTA | Option kit for UK EKHTSU200-270A | - | - | ○ | ○ | - | - |
| EKFMAHTA (5) | Option kit for standalone tank | ○ | ○ | ○ | ○ | ○ | ○ |

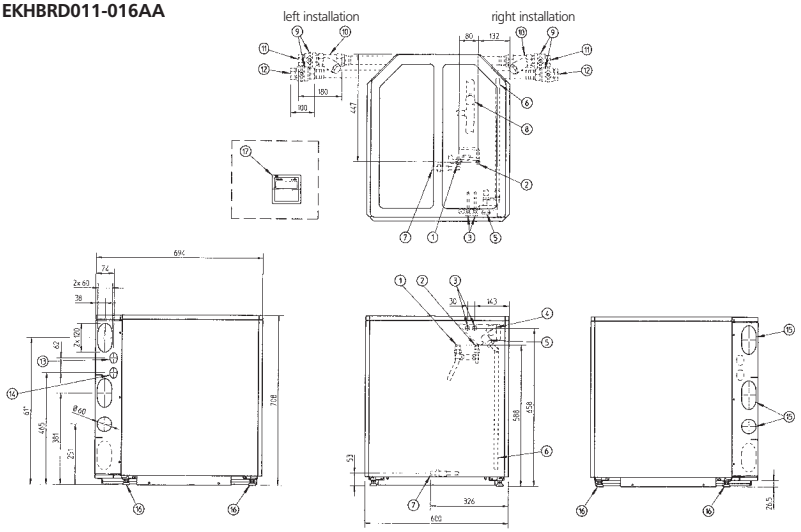
Remarks: Other combinations are not guaranteed
(1) If bottom plate heater tape is installed (EKBPHTH16A), it is not allowed to install a drain kit
(2) requires Demand PCB EKRP1AHTA.
(3) Required to install to be able to connect Roomthermostat or BUH kit.
(4) Same controller as supplied with Cascade unit can be mounted parallel or on other location. If 2 controllers are installed, the installer needs to select 1 master and 1 slave.
(5) Only required if tank is NOT mounted on top of cascade indoor unit.

3TW58749-2B

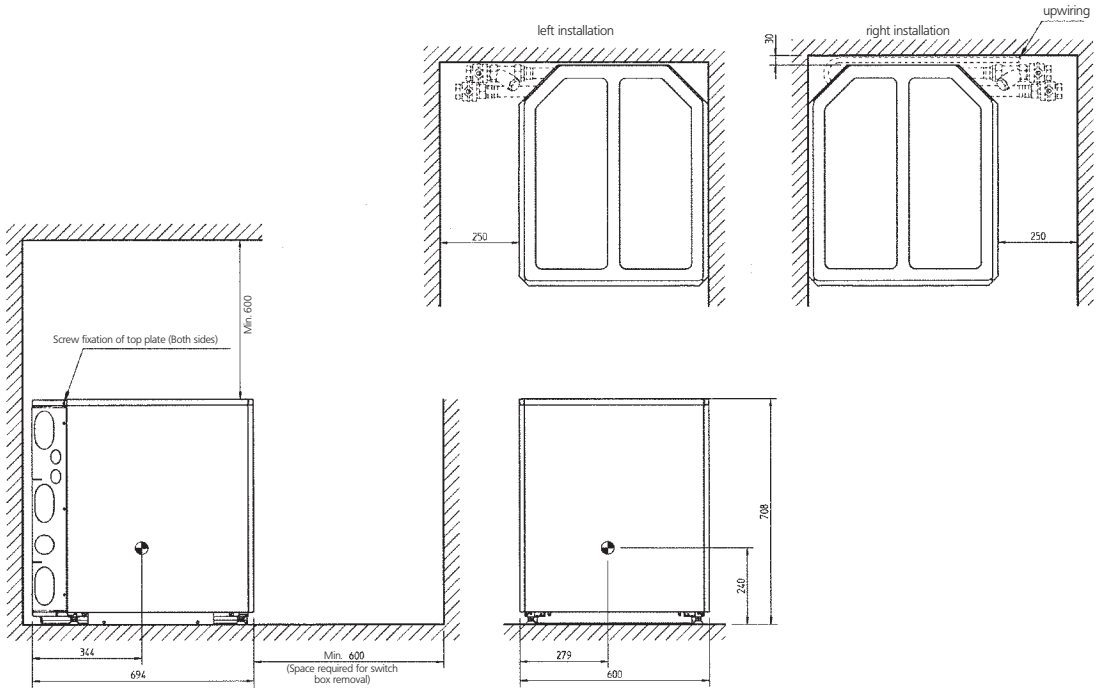
# 4 Dimensional drawing & centre of gravity

## 4 - 1 Dimensional drawing

**EKHBRD011-016AA**




1 Gas pipe connection Φ 15.9 flare (R410A)
2 Liquid pipe connection Φ 9.5 flare (R410A)
3 Service ports Φ 12.7 flare (R410a)
4 Pressure gauge
5 Blow off valve
6 Flexible hose blow off valve Φ 20
7 Drain valve water circuit
8 Air purge
9 Shut-off valves
10 Water filter
11 Water in connection G 1-1/4" (Female)
12 Water out connection G 1-1/4" (Female)
13 Control wiring intake (Knock-out hole Φ 37)
14 Power supply wiring intake (Knock-out hole Φ 37)
15 Knock-out holes for refrigerant piping and water piping
16 Levelling feet
17 Remote controller (delivered as accessory)
Installation location is outside the unit

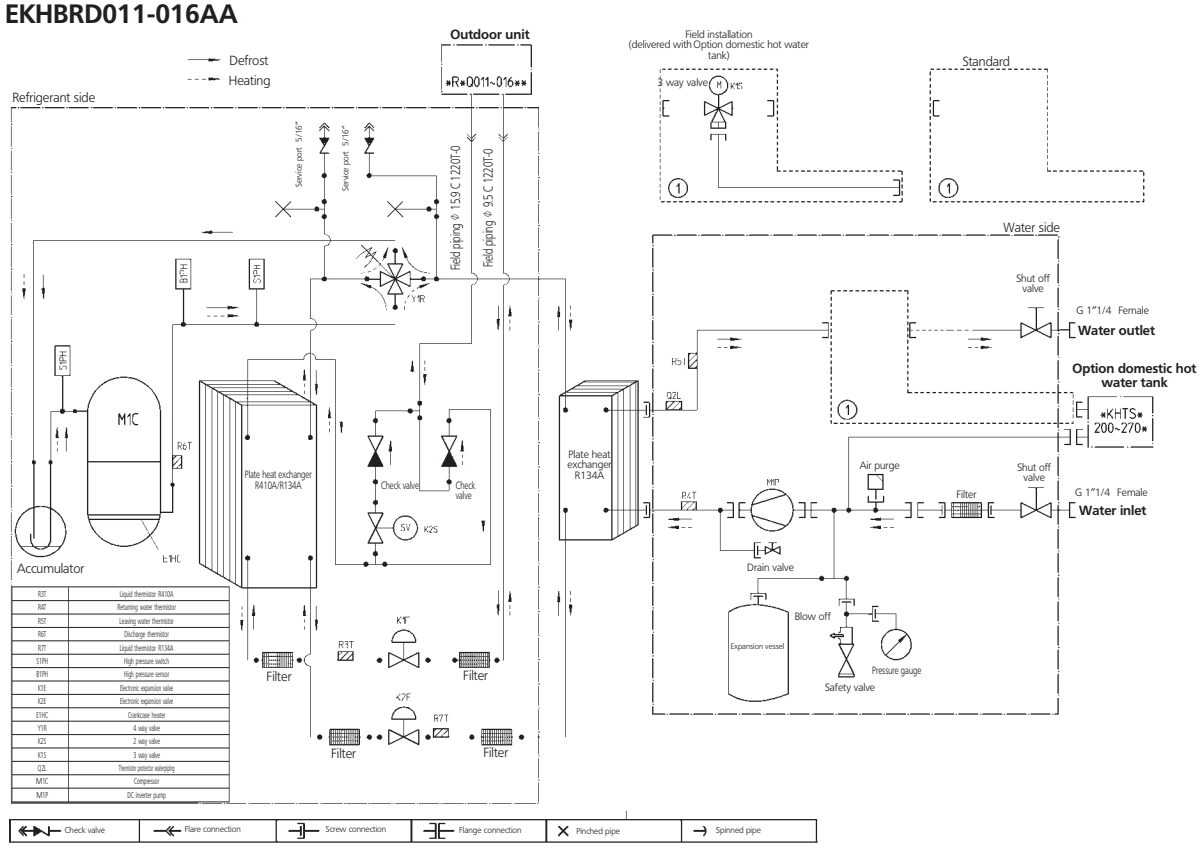



3TW58844-1A

6
4

# 5 Piping diagram

## EKHBRD011-016AA




| | |
|---|---|
| R1T | Liquid thermistor R410A |
| R4T | Returning water thermistor |
| R5T | Leaving water thermistor |
| R6T | Discharge thermistor |
| R7T | Liquid thermistor R134A |
| S1PH | High pressure switch |
| B1PH | High pressure sensor |
| K1E | Electronic expansion valve |
| K2E | Electronic expansion valve |
| E1HC | Crankcase heater |
| Y1R | 4 way valve |
| K2S | 2 way valve |
| K1S | 3 way valve |
| Q2L | Thermistor protector w/wiring |
| M1C | Compressor |
| M1P | DC inverter pump |

# 6 Wiring diagram

## 6 - 1 Wiring diagram

**NOTES TO GO THROUGH BEFORE STARTING THE UNIT**

X1M : Main terminal
X2M : Fieldwiring terminal for AC
X3M : Fieldwiring terminal for DC

— - — - : Earth wiring
- - - - - - - - - - : Field supply

: Option

: Wiring depending on model

: Not mounted in switchbox

: PCB

—**/12.2 : Connection ** continues on page 12 column 2

: Several wiring possibilities

**User installed:**

Domestic hot water tank
Room thermostat (Wired)
Room thermostat (Wireless)
External temperature sensor
Remote user interface
Digital I/O PCB
Demand PCB
Bottom plate heater

**Legend**

* : included in option kit
\# : field supplied

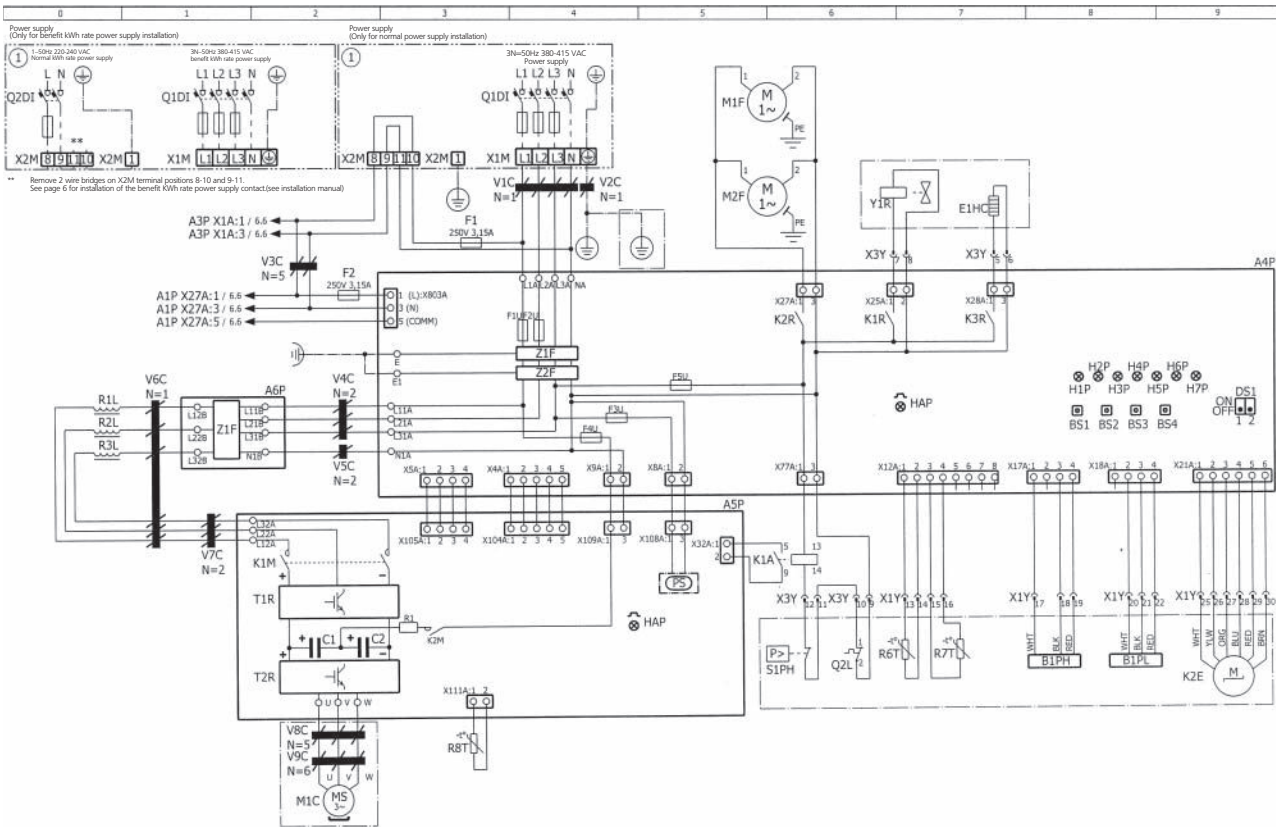
| | | |
|---|---|---|
| A1P | | : Main PCB |
| A2P | | : User interface PCB |
| A3P | | : control PCB |
| A4P | | : Inverter control PCB |
| A5P | | : Inverter PCB |
| A6P | | : Filter PCB |
| A7P | * | : Digital I/O PCB (Optional) |
| A8P | * | : Demand PCB (Optional) |
| A10P | * | : Thermostat PCB (Optional) |
| A11P | * | : Receiver PCB (Optional) |
| B1PH | | : High pressure sensor |
| B1PL | | : Low pressure sensor |
| BS1-BS4 (A4P) | | : Push button |
| C1-C2 | | : Filter capacitor |
| C1-C2 (ASP) | | : PCB Capacitor |
| DS1 (A*P) | | : Dipswitch |
| E7H | * | : Bottom plate heater |
| E1HC | | : Crankcase heater |
| F1-F2 | | : Inline fuse |
| F1U (A1P,A3P) | | : Fuse (T, 3.15A, 250V) |
| F1U-F2U (A4P) | | : Fuse (3.15A, 500V) |
| F3U-F5U (A4P) | | : Fuse (6.3A, 250V) |
| F1U-F2U (A7P) | * | : Fuse (5A, 250V) |
| H1P-H7P (A4P) | | : PCB LED |
| HAP (A*P) | | : PCB LED |
| K1A | | : Interface relay |
| K1E | | : Electronic expansion valve |
| K2E | | : Electronic expansion valve |
| K1M-K2M | | : PCB Contactor |
| K*R (A*P) | | : PCB Relay |
| K1S | * | : 3 way valve |
| K2S | | : 2 way valve |
| M1C | | : Compressor |
| M1F-M2F | | : Switchbox cooling fan |
| M1P | | : DC inverter pump |
| PC (A11P) | * | : Power circuit |
| PHC1 | | : Optocoupler input circuit |
| PS (A*P) | | : Switching power supply |
| Q1DI-Q2DI | # | : Earth leakage circuit breaker |
| Q2L | | : Thermal protector water piping |
| R1 (A5P) | | : Resistance |
| R1L-R3L | | : Reactor |
| R1H | * | : Humidity sensor |
| R1T | * | : Ambient sensor |
| R2T | * | : Domestic hot water tank Thermistor |
| R2T | * | : External sensor (floor or ambient) (Optional) |
| R3T | | : Liquid thermistor R410A |
| R4T | | : Returning water thermistor |
| R5T | | : Leaving water thermistor |
| R6T | | : Discharge thermistor |
| R7T | | : Liquid thermistor R134a |
| R8T | | : Fin thermistor |
| RC (A*P) | | : Receiver circuit |
| S1PH | | : High pressure switch |
| S1S | # | : benefit kWh rate power supply contact |
| S3S | # | : Input multiple setpoint 1 |
| S4S | # | : Input multiple setpoint 2 |
| SS1 (A1P) | | : Selector switch(emergency) |
| SS1 (A2P) | | : Selector switch(master slave) |
| SS1 (A7P) | * | : Selector switch |
| TC (A*P) | | : Transmitter circuit |
| T1R-T2R (A*P) | | : Diode bridge |
| V1C-V12C | | : Ferrite core noise filter |
| X1M-X3M | | : Terminal strip |
| X*M (A*P) | * | : PCB terminal strip |
| X1Y-X4Y | | : Connector |
| Y1R | | : 4 way valve |
| Z1F-Z5F (A*P) | | : Noise filter |

4TW58846-2C

# 6 Wiring diagram

## 6 - 1 Wiring diagram

**EKHBRD-AAY1**



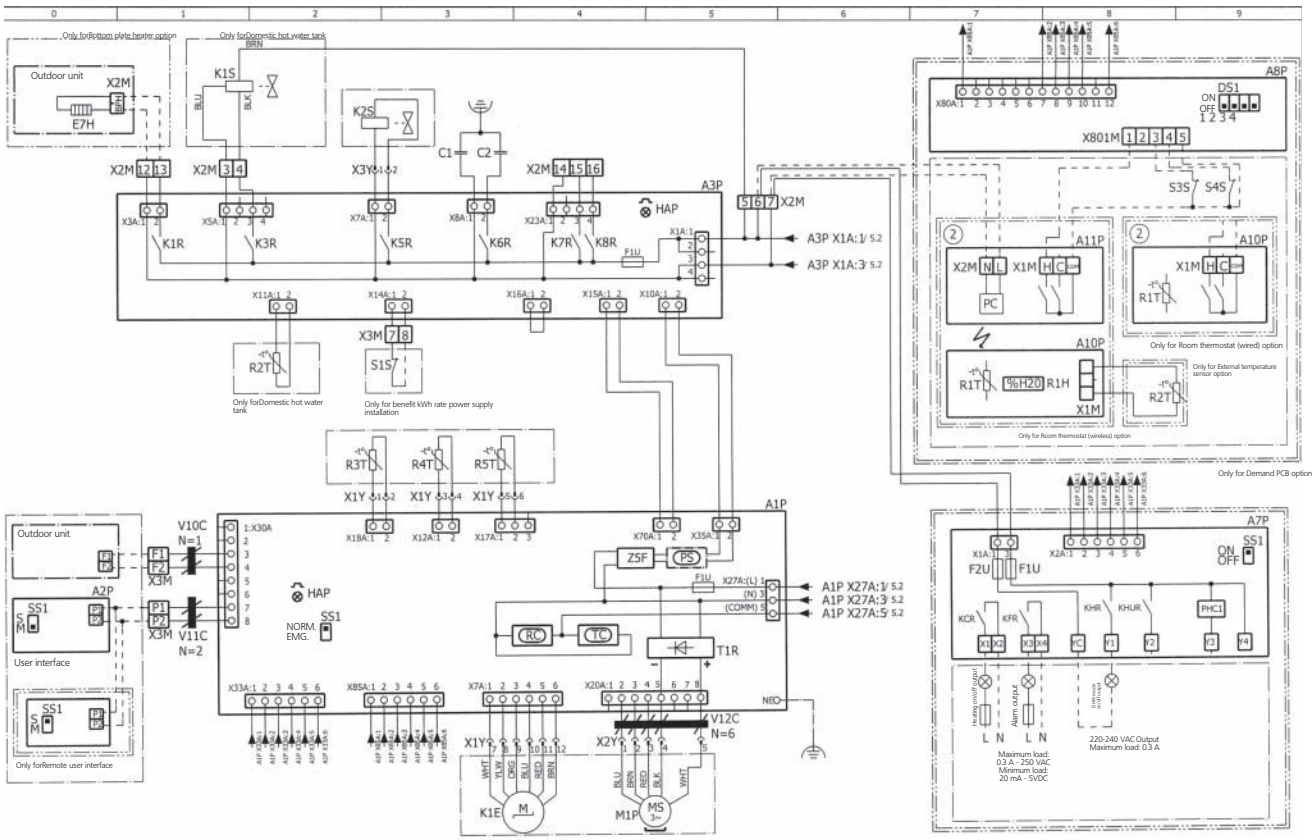

Description
**Compressor circuit**

4TW58846-2C-2

# 6 Wiring diagram

## 6 - 1 Wiring diagram

**EKHBRD-AAY1**



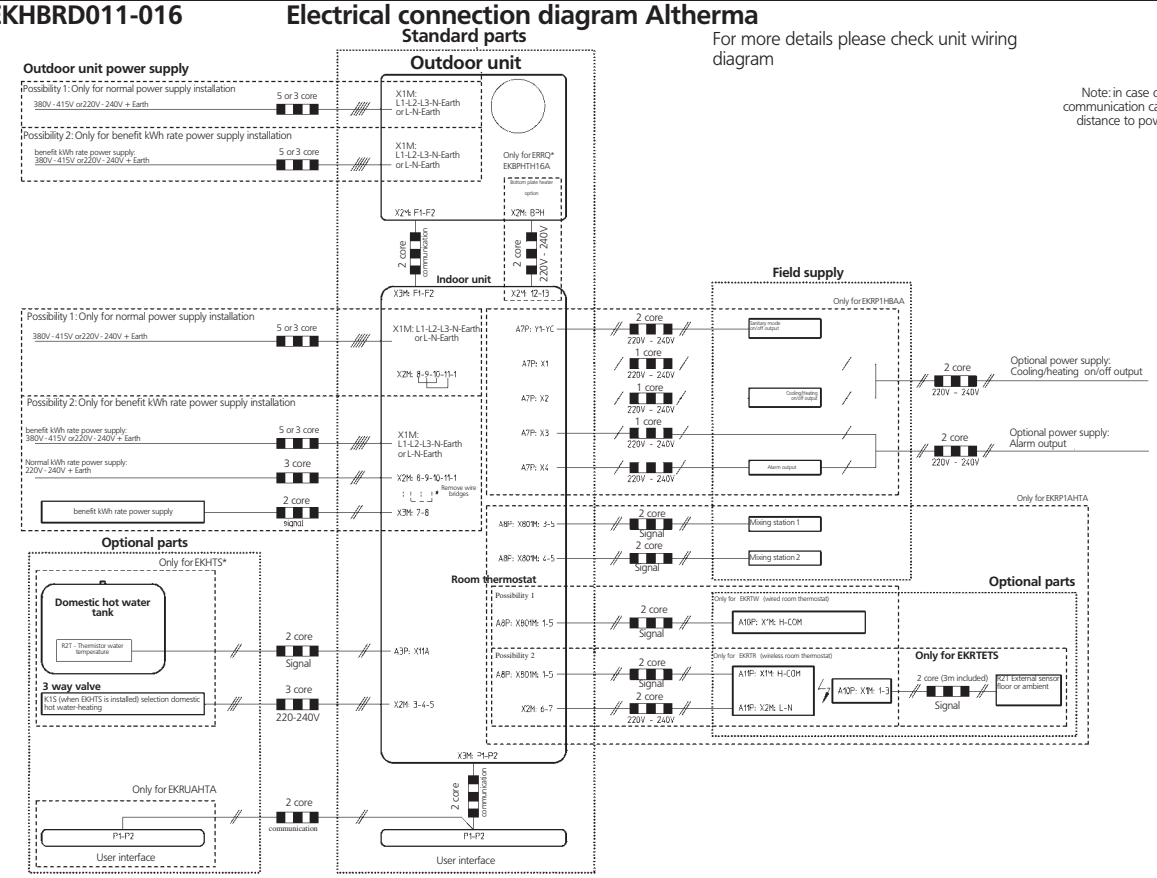

Description
**Control circuit**

4TW58846-2C-3

# 6 Wiring diagram

## 6 - 2 External connection diagram

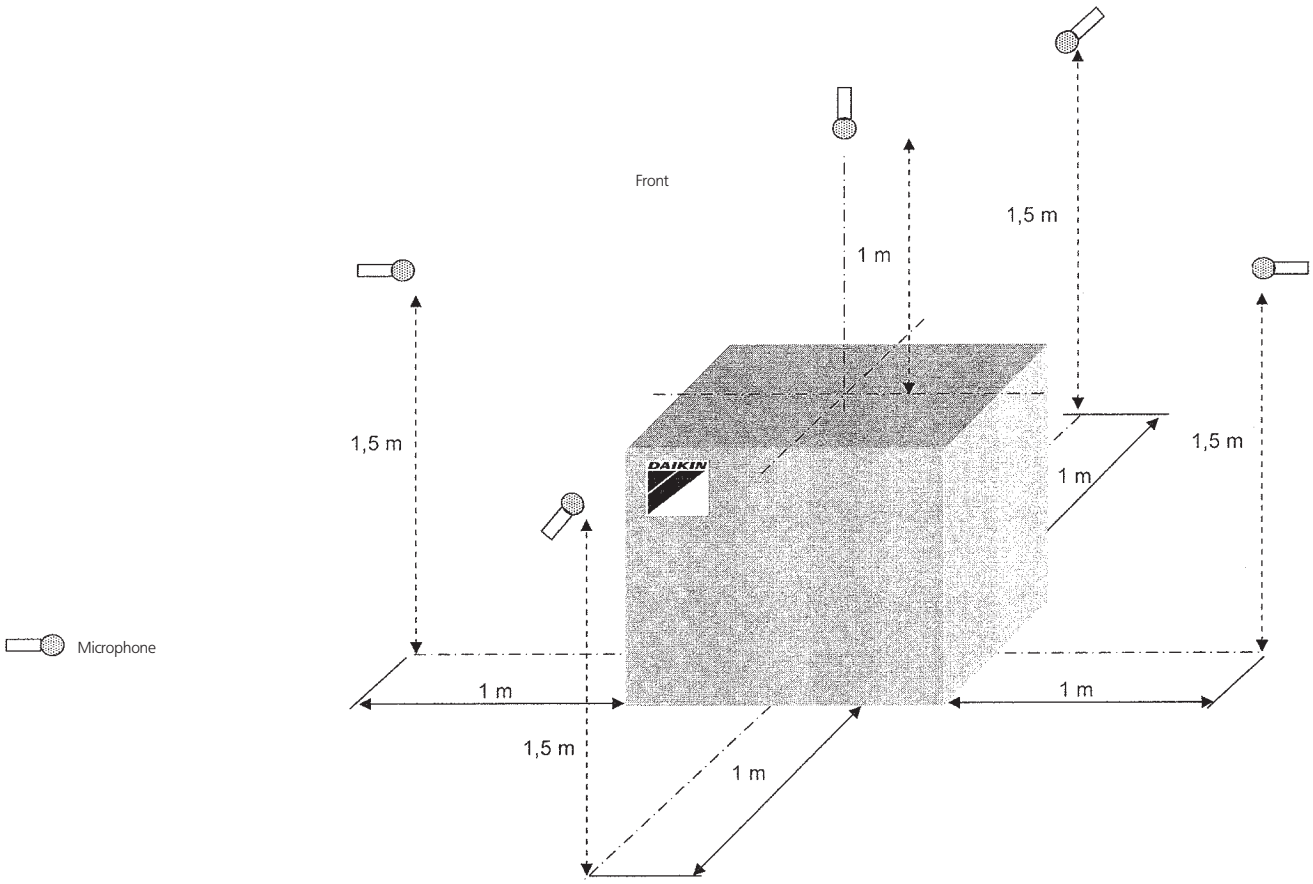
**EKHBRD011-016** **Electrical connection diagram Altherma**



# 7 Sound data

## 7 - 1 Sound pressure spectrum

**EKHBRD011-016AA**




**Sound levels**

| Sound pressure [dBA] - standalone | 11(V1/Y1) | 14(V1/Y1) | 16(V1/Y1) |
|---|---|---|---|
| [EW/LW 55/65°C] | | | |
| Front | 40 | 43 | 46 |
| Left / Right / Back / Top (*) | 43 | 45 | 46 |
| [EW/LW 70/80°C] | | | |
| Front | 46 | 46 | 46 |
| Left / Right / Back / Top (*) | 46 | 46 | 46 |
| [EW/LW 55/65°C] - Low sound mode n°1 | | | |
| Front | 39 | 40 | 43 |
| Left / Right / Back / Top (*) | 40 | 43 | 45 |

| Sound pressure [dBA] - Integrated (+Tank) | 11(V1/Y1) | 14(V1/Y1) | 16(V1/Y1) |
|---|---|---|---|
| [EW/LW 55/65°C] | | | |
| Front | 38 | 39 | 42 |
| Left / Right / Back / Top (*) | 41 | 44 | 45 |
| [EW/LW 70/80°C] | | | |
| Front | 43 | 43 | 43 |
| Left / Right / Back / Top (*) | 46 | 46 | 46 |
| [EW/LW 55/65°C] - Low sound mode n°1 | | | |
| Front | 37 | 38 | 39 |
| Left / Right / Back / Top (*) | 40 | 41 | 44 |

**Notes**

- The above data is valid in free field condition, because it is measured in a semi-anechoic room. If sound is measured under actual installation conditions, the measured value will be higher due to environmental noise and sound reflections. Choose the installation location carefully and do not install in a sound sensitive environment (e.g. living room, bedroom, . . .)
- dB(A) = A-weighted sound power level (A-scale according to IEC)
- EW = Entering water temperature
- LW = Leaving water temperature
- Reference acoustic pressure 0dB = 20µPa
- Sound pressure level of low sound mode n°2 and n°3 is lower than n°1
- (*) Does not occur simultanuously on all sides.

3TW58847-1B

# 7 Sound data

## 7 - 2 Sound power spectrum

**EKHBRD011-016AA**

| | Sound power Lw per Octave band (dB) | | | | | | | Total (dBA) |
|---|---|---|---|---|---|---|---|---|
| | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | LwA |
| EKHBRD011AAV1 | 53 | 61 | 61 | 49 | 43 | 39 | 34 | 59 |
| EKHBRD014AAV1 | 73 | 61 | 61 | 51 | 43 | 42 | 38 | 60 |
| EKHBRD016AAV1 | 72 | 61 | 60 | 49 | 44 | 43 | 39 | 60 |

**Notes**

- Measured according to ISO3744
- Reference acoustic intensity 0dB = 10E-6μW/m²
- dBA=A-weighted sound power level

- Unit condition: Ta=7/6°C - Heating setpoint70/80°C - Maximum compressor frequency

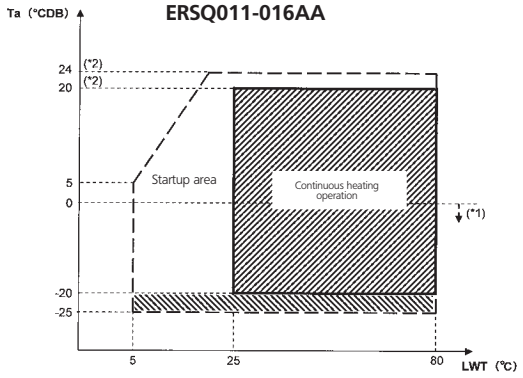
- If sound is measured under actual installation conditions, the measured value will be higher due to environmental noise and sound reflections. Choose the installation location carefully and do not install in a sound sensitive environment (e.g. living room, bedroom, . . .)

4TW58847-3

# 8 Operation range

Space heating mode

**EKHBRD011-016AA**
**ERSQ011-016AA**




Continuous heating operation

Startup area

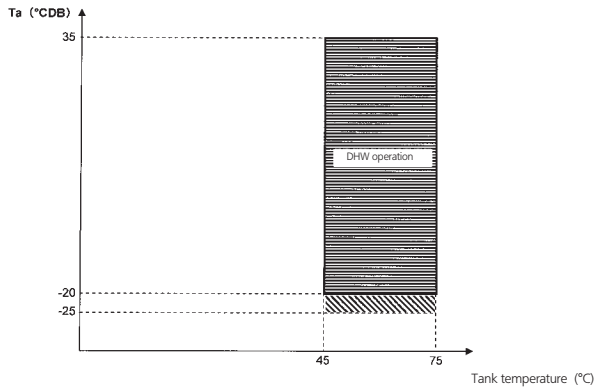
operation possible, but no guarantee of capacity

(*1) ERRQ*(V1/Y1) units include special equipment (insulation, heater sheet, ...) to ensure good operation in areas where low ambient temperature can occur together with high humidity conditions
In such conditions ERQS*5V1/Y1) models may experience problems with severe ice build up on the aircooled coil.
In case such conditions are expected the ERRQ*(V1/Y1) must be installed instead.
These models contain countermeasures to prevent freeze up.

(*2) Can be adjusted by field setting

Domestic hot water mode

**EKHTS-A**




Domestic hot water operation

operation possible, but no guarantee of capacity

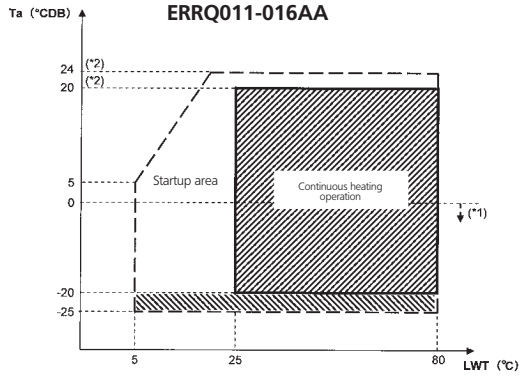
3TW58843-1B

6
8

# 8 Operation range

Space heating mode

**EKHBRD011-016AA**
**ERRQ011-016AA**




Continuous heating operation

Startup area

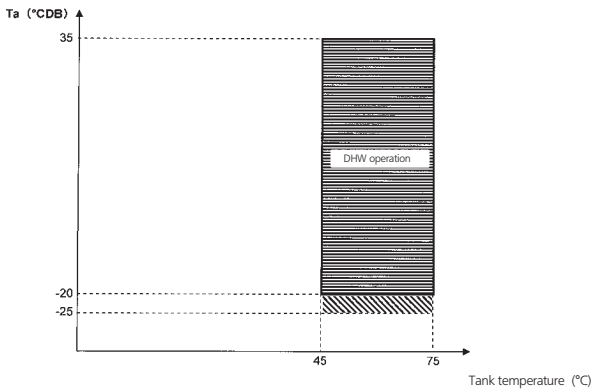
operation possible, but no guarantee of capacity

(*1) ERRQ*(V1/Y1) units include special equipment (insulation, heater sheet, . . .) to ensure good operation in areas where low ambient temperature can occur together with high humidity conditions
In such conditions ERQS*5V1/Y1) models may experience problems with severe ice build up on the aircooled coil.
In case such conditions are expected the ERRQ*(V1/Y1) must be installed instead.
These models contain countermeasures to prevent freeze up.

(*2) Can be adjusted by field setting

Domestic hot water mode

**EKHTS-A**




Domestic hot water operation

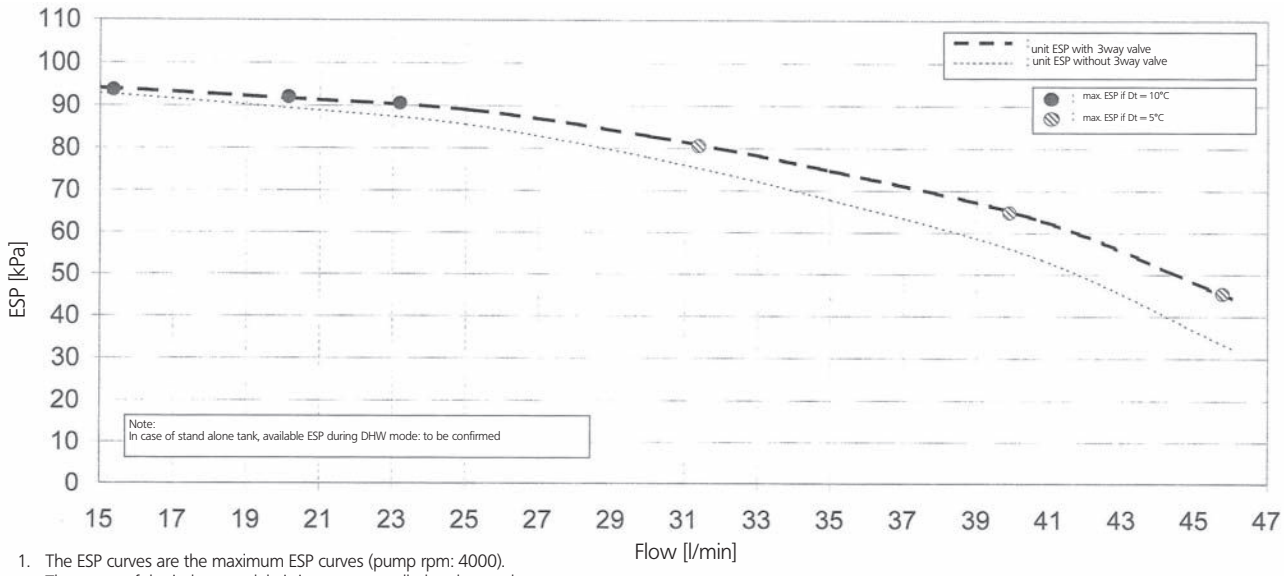
operation possible, but no guarantee of capacity

3TW58843-1B

# 9 Hydraulic performance

## 9 - 1 Static pressure drop unit

**EKHBRD011-016AA**




1. The ESP curves are the maximum ESP curves (pump rpm: 4000). The pump of the indoor module is inverter controlled and controls to have a fixed △T between return and leaving water temperature.
2. In case of installing a domestic hot water tank there is an additional pressure drop over the three way valve (delivered as accessory with the tank)

ESP: External static pressure
Flow: waterflow through the unit

Warning
1. Selecting a flow outside the curves can cause damage to or malfunction of the unit. See also minimum and maximum allowed water flowrange in the technical specifications.
2. Water quality must be according to EN directive EC 98/83 EC.

3TW58849-6

6
9